Design and Implementation of a Digital Police Assistance Application for Enhancing Public Services

Rio Martin[1], Nia Oktaviani[2], Evi Yulianingsih [3]
[1,2,3]Author's Information System, Faculty of Sains and Technology, Universitas Bina Darma
rio.martin94@gmail.com

Submitted: October 2, 2025; accepted: May 5, 2026

Abstract

Public service delivery in law enforcement is often hindered by limited accessibility, manual procedures, and lack of transparency in complaint handling. This study proposes the Digital Police Assistance Application, a mobile platform designed to integrate incident reporting, real-time tracking, information dissemination, and an administrative dashboard for police officers. The system was developed using the Waterfall model with Flutter for cross-platform mobile development, Node.js with Express for backend services, and MySQL for data storage. Functional validation through Black Box testing confirmed that all modules operated as intended. Usability evaluation involving 30 participants (15 citizens and 15 police officers) employed the System Usability Scale (SUS). The application achieved an average SUS score of 82.5, categorized as "Excellent," with citizens scoring slightly higher (84.2) than police officers (80.7). Citizens appreciated the simplicity and transparency of complaint tracking, while police officers highlighted dashboard efficiency and suggested integration with internal databases. These results demonstrate that the application is both functional and user-friendly, with strong potential to enhance transparency, efficiency, and trust in police services. Future work will address system interoperability, security improvements, and pilot testing across multiple jurisdictions.

***Keywords**: digital policing, public service, mobile application, usability, complaint management.*

1. Introduction

Public service delivery in the law enforcement sector requires fast, transparent, and accountable communication between the police and the public. In practice, many communities still rely on conventional mechanisms such as telephone hotlines, walk-in complaints, or manual reporting, which are often ineffective. These methods face several challenges: long response times, limited accessibility, lack of documentation, and the potential for communication breakdowns. As a result, the quality of police services and public trust can be compromised.

In recent years, information and communication technology has been widely adopted in government and law enforcement to address these challenges. Studies have shown that mobile-based service applications can significantly reduce response time, improve documentation, and increase citizen participation in governance [1], [2]. For example, mobile policing systems in developed countries have successfully integrated citizen reporting with real-time police response, leading to enhanced public safety and institutional accountability [3].

Several prior works have attempted to design digital platforms for complaint management and police–community interaction. Some studies developed web-based systems for public complaints but did not extend them to mobile applications, thereby limiting accessibility [4]. Other research focused narrowly on traffic violation reporting or specific emergency cases, without incorporating broader features such as case tracking and information dissemination [5]. A few studies explored the concept of mobile policing in Indonesia, but most remained at the level of conceptual frameworks or descriptive analysis without implementing or evaluating a working application [6]. These limitations highlight the lack of comprehensive and evaluated solutions tailored to local contexts.

To address these challenges, this study proposes the design and implementation of a Digital Police Assistance Application that facilitates real-time incident reporting, case tracking, and public information services. The application is developed using a Software Development Life Cycle (SDLC) approach to ensure systematic analysis, design, implementation, and evaluation. The contribution of this research lies in providing a comprehensive digital solution that not only enables citizens to report incidents quickly and transparently, but also allows the police to manage and respond to these reports more efficiently. Furthermore, the system incorporates features for information dissemination to strengthen police–

community communication and trust. Unlike previous studies that focused only on specific aspects or lacked evaluation, this work offers a complete cycle of system development and includes both functional and usability testing to validate its effectiveness in real-world scenarios.

2. Method

This study employed a Software Development Life Cycle (SDLC) approach using the Waterfall model, which is suitable for structured system development that requires sequential phases from analysis to testing. The methodology consisted of five stages: requirements analysis, system design, implementation, testing, and deployment, as illustrated in Fig. 1.

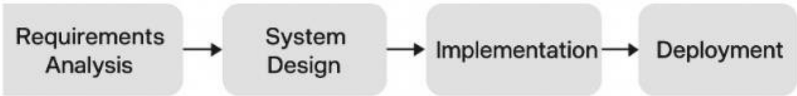


Fig. 1. Research flow based on the Waterfall model.

2.1. Requirements Analysis

The requirement analysis stage is the foundation of the system development process because it ensures that the application to be built truly addresses the needs of both the police institution and the community. In this study, requirements were collected through a series of interviews, direct observations, and literature reviews related to digital complaint management systems. This process involved two groups of stakeholders: police officers from the Public Relations Division, who serve as system administrators, and community representatives, who act as end users of the mobile application.

The analysis revealed two main categories of requirements, namely functional and non-functional. Functional requirements define the core capabilities that the system must provide. The first requirement is that citizens must be able to submit incident reports in a complete manner, not only in the form of text but also enriched with supporting evidence such as photographs and geographic location. This feature is crucial to ensure that the police can verify reports quickly and accurately. Second, the system must allow citizens to track the status of their complaints in real time, thereby ensuring transparency and maintaining public trust in the handling process. Third, police officers must have the ability to receive, review, and update reports through an administrative dashboard, enabling efficient case management. Finally, the system should support the dissemination of public announcements, such as traffic advisories or safety warnings, to strengthen two-way communication between the police and the community.

In addition to functional aspects, several non-functional requirements were also identified to guarantee the reliability and sustainability of the application. The first requirement is platform accessibility, ensuring that the system can run smoothly on commonly used mobile devices (Android/iOS) to maximize user reach. Second, the application must implement secure communication protocols and authentication mechanisms to protect sensitive information submitted by citizens and managed by the police. Third, considering the varying quality of internet connectivity in many regions, the system must be designed to operate efficiently under limited network conditions, ensuring that essential services such as complaint submission and notification remain available even with unstable connections.

2.2. System Design

The system design stage defines how the application will meet the identified requirements and ensures that the interactions between users and the system are modeled clearly. In this study, Unified Modeling Language (UML) was employed to represent system processes, user interactions, and data flow. The first stage of design was the creation of a Use Case Diagram, which illustrates how end users (citizens) and administrators (police officers) interact with the application. Citizens are able to perform tasks such as submitting incident reports, tracking the progress of their complaints, and receiving official announcements. Meanwhile, police officers can access the administrative dashboard to review incoming reports, update case statuses, and publish public information. This design ensures that both user roles are accommodated in a structured and transparent workflow. The second design aspect was the system architecture, which adopts a client–server model. The mobile application acts as the client, providing an intuitive interface for citizens to interact with the system. This client connects to a backend server via RESTful APIs, which handle requests such as report submission, data retrieval, and case status updates. The backend is responsible for business logic and data management, supported by a relational database (MySQL) that stores structured information about users, reports, and case progress. This architecture was chosen because it enables scalability, security, and efficient data synchronization across multiple clients. The Use Case Diagram in Fig. 2 illustrates the interaction between citizens and police officers through the system.

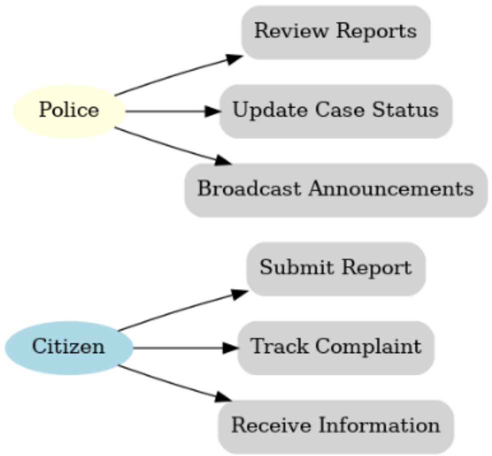


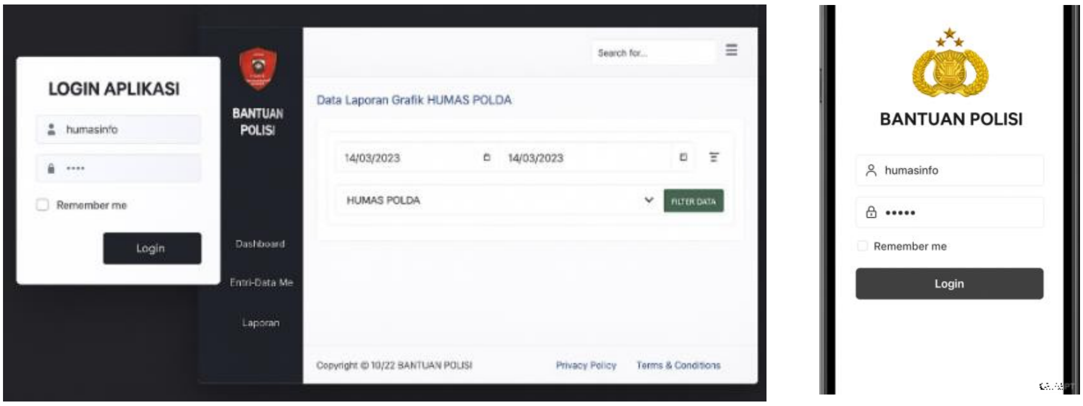
Fig. 2. Use case diagram of the Digital Police Assistance Application

The system design focuses on modeling user interactions and core functionalities through a use case diagram, ensuring that all requirements identified during the analysis phase are captured accurately. The diagram defines two main actors: citizens and police officers, each interacting with the system through distinct functional modules. As illustrated in Fig. 2, the use case diagram clearly defines the interaction between citizens and police officers, ensuring that both user groups are supported through well-defined processes. Citizens can submit and track complaints, while police officers can verify, manage, and respond to these reports through the administrative dashboard. This visualization confirms that the system accommodates both public engagement and internal workflow needs. To implement the system, four main modules were developed:

1. Complaint Module: Enables citizens to submit incident reports with text, photos, and location data, ensuring report accuracy and credibility as supported by previous research on incident reporting systems [2].
2. Tracking Module: Provides real-time updates on complaint status to enhance transparency and accountability in public service, a factor closely linked to citizen trust [3].
3. Information Module: Allows the police to broadcast official announcements such as traffic updates and emergency alerts, ensuring timely and centralized communication.
4. Administration Dashboard: Offers police officers tools to monitor reports, update case statuses, and generate performance summaries, supporting efficient decision-making and operational oversight.

2.3. Implementation

The implementation stage focused on translating the system design into a working prototype of the *Digital Police Assistance Application*. To ensure scalability, maintainability, and ease of deployment, the system was implemented using a hybrid technology stack that combines mobile development frameworks, backend services, and database management systems. On the police side, the web-based administrative dashboard was deployed, providing access for officers to securely log in, monitor reports, and manage complaint data. The interface was designed to be simple yet functional, enabling officers to perform key tasks such as dashboard monitoring, filtering reports by date or organizational unit, and managing public announcements. Meanwhile, the mobile version of the application was designed to facilitate citizen interaction with the system. Through the mobile app, users can log in securely and access essential features such as incident reporting, complaint tracking, and information updates. The design emphasizes usability and simplicity to ensure accessibility across a wide range of users. As illustrated in Fig. 3, the system interface includes (a) the login and dashboard view of the web application for police officers, and (b) the mobile login interface for citizens.



(a) (b)

Fig. 3 Interfaces of the Digital Police Assistance Application: (a) web dashboard and login for police officers, (b) mobile login interface for citizens.

On the client side, the mobile application was developed using the Flutter framework, which supports cross-platform deployment on both Android and iOS devices. Flutter was chosen because of its performance advantages, single codebase, and flexible user interface components, which allow the creation of an intuitive and responsive interface for citizens. The application interface was designed to be simple, prioritizing key functionalities such as complaint submission, tracking, and information display, in order to maximize usability for a diverse user base.

On the server side, the system employed Node.js with the Express framework to handle API requests and implement business logic. Node.js was selected due to its non-blocking, event-driven architecture, which provides high scalability for concurrent request handling, an important factor in public service systems where multiple users may report incidents simultaneously. For data storage, a MySQL relational database was used to manage structured information such as user data, incident reports, case statuses, and broadcast messages. MySQL was chosen for its reliability, relational integrity, and compatibility with widely adopted standards. The schema was designed based on normalization principles to ensure data consistency and support efficient querying. Additionally, the application integrated Google Maps API to enable location-based reporting. This feature allows citizens to attach geospatial coordinates to their incident reports, helping police officers quickly identify and verify the reported location. By embedding maps within the mobile application, users can also visualize nearby incidents or police announcements associated with specific areas.

Security was a critical aspect of the implementation. The system applied JSON Web Token (JWT) authentication to ensure secure communication between the client and the server. Each login session generates a token that validates user identity for subsequent requests, preventing unauthorized access. Combined with HTTPS encryption, this mechanism strengthens the confidentiality and integrity of sensitive user data.

The overall implementation followed a client–server architecture, illustrated in Fig. 4. The mobile application acts as the client, communicating with the backend server through RESTful APIs. The backend then processes requests, manages business logic, interacts with the MySQL database for structured data storage, and connects to external services such as Google Maps API for location-based features.

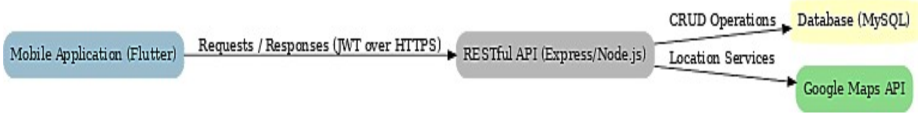


Fig. 4 System architecture of the Digital Police Assistance Application.

This modular implementation ensures that the system not only fulfills functional requirements but also achieves the non-functional requirements of scalability, security, and reliability. In addition, the architecture allows future extensions such as integration with national police databases or the incorporation of advanced analytics for incident classification.

2.4. Testing

The testing phase was conducted to verify that the Digital Police Assistance Application functioned in accordance with its design specifications and met user expectations. Testing was divided into two stages: functional testing and usability testing, each addressing different quality aspects of the system.

Functional testing was carried out using the Black Box testing method, which focuses on examining the system's behavior against predefined requirements without considering internal code structures. Test cases were prepared for each core feature of the application, including complaint submission, case tracking, information dissemination, and administrative dashboard operations. For instance, the complaint submission module was tested to ensure that reports containing text, photographs, and geolocation data were successfully transmitted and stored in the database, while the tracking module was validated to confirm that citizens received accurate and timely updates on the status of their reports. The results demonstrated whether each functional requirement identified in the requirement analysis stage was successfully implemented.

Usability testing was conducted to evaluate the system from the perspective of end users, focusing on ease of use, clarity of the interface, and overall user satisfaction. This evaluation employed the System Usability Scale (SUS), a widely recognized instrument for assessing usability in information systems [1]. A total of 30 participants took part in the test, consisting of 15 community users and 15 police officers. Each participant was asked to perform representative tasks, such as submitting a complaint, checking complaint status, and responding to a report through the dashboard. After completing the tasks, they filled out the SUS questionnaire, which produced a numerical score reflecting their perception of the system's usability.

In addition, observations and feedback sessions were conducted during usability testing to capture qualitative insights, such as suggestions for interface improvements, perceived barriers, and recommendations for additional features. This combination of quantitative SUS scoring and qualitative user feedback provided a more comprehensive understanding of how effectively the application served its intended audience.

2.5. Deployment

The final stage of the development process was the deployment of the Digital Police Assistance Application into an operational environment. Deployment is a crucial step to ensure that the system is accessible to intended users and can function reliably under real-world conditions. The application was deployed using a cloud-based infrastructure, which provides scalability, flexibility, and high availability. The backend server and database were hosted on a cloud service provider that supports virtual private servers (VPS) with resource monitoring and automatic scaling capabilities. This environment was selected to accommodate fluctuating workloads, such as peak complaint submissions during specific events or emergencies.

The mobile application was packaged and distributed through Android Package Kit (APK) for Android users, with future support planned for deployment through official app stores. The APK file could be installed directly by citizens, ensuring accessibility without complex installation procedures. For the iOS platform, the application was prepared for deployment via the Apple App Store following compliance with platform policies.

On the police side, the administrative dashboard was deployed as a web application accessible via modern web browsers. Access to the dashboard was secured using HTTPS protocol combined with role-based authentication through JSON Web Tokens (JWT), ensuring that only authorized personnel could manage and respond to complaints. To further enhance security and data protection, daily database backups were scheduled automatically and stored in an encrypted format on secure cloud storage. This backup strategy ensures system resilience in case of technical failures or cyberattacks. Logging and monitoring tools were also integrated to track server performance, API usage, and suspicious activities in real time.

3. Result and Discussion

The Digital Police Assistance Application was successfully developed and deployed based on the requirements and design specified in Section II. This section presents the outcomes of the implementation, including system interface, functional validation, usability evaluation, and discussion of the findings in relation to the research objectives.

3.1. System Interface

The application provides a user-friendly interface for both citizens and police officers. On the citizen side, the home screen includes options for submitting new incident reports, tracking previously submitted complaints, and viewing public announcements. The complaint submission form allows users to attach text descriptions, photographs, and geolocation data through Google Maps integration. The tracking module displays the status of each report, classified as *Received*, *In Progress*, or *Resolved*.

On the police side, the administrative dashboard provides an overview of all incoming reports, categorized by status and priority. Officers can update case progress, respond to citizen submissions, and broadcast official announcements. The dashboard also includes a statistical summary of complaint trends, which can assist in performance monitoring and decision-making.

3.2. Functional Testing

Functional validation was performed using the Black Box testing method, in which test cases were designed for each major feature of the application. This approach ensured that every function was evaluated based on expected user behavior and output rather than internal code structure. The results of the functional testing are presented in Table 1.

Table 1. Functional Testing Results

Feature	Expected result	Status
Complaint submission	Report with text, photo, and location saved	Passed
Complaint tracking	Status updated in real time	Passed
Information dissemination	Announcement broadcast to all active users	Passed
Admin report management	Reports updated and stored in database	Passed
Authentication	Valid users authenticated via JWT	Passed

Table 1 presents the results of the functional testing conducted using the Black Box testing approach. Each feature of the Digital Police Assistance Application was tested to verify that it performed according to the specified requirements. The results show that all major functionalities operated successfully without any critical errors.

Specifically, the complaint submission module allowed users to submit reports complete with text descriptions, photos, and geolocation data, all of which were correctly stored in the system database. The complaint tracking feature accurately updated the status of each report in real time, ensuring transparency and continuous user feedback. The information dissemination function effectively broadcasted announcements to all active users, confirming the system's ability to handle one-to-many communications efficiently. The administrative report management module successfully stored and updated reports within the database, supporting back-office operations and monitoring activities. Finally, the authentication mechanism validated all registered users using JSON Web Token (JWT)-based verification, ensuring secure access and preventing unauthorized use.

3.3. Usability Testing

Usability testing was conducted to evaluate the overall user experience of the Digital Police Assistance Application. A total of 30 participants were involved, consisting of 15 citizens and 15 police officers, representing both end-user groups of the system. The evaluation employed the System Usability Scale (SUS), a standardized questionnaire that provides a quick and reliable measure of usability through ten statements rated on a five-point Likert scale [3].

The SUS produces a score ranging from 0 to 100, with values above 68 generally considered above average, and scores above 80 categorized as "Excellent." The application achieved an average SUS score of 82.5, indicating a high level of usability. When broken down by user groups, citizens scored the system at 84.2, while police officers scored it at 80.7, both of which fall in the "Excellent" range.

To better understand the usability performance, the SUS items were analyzed across three dimensions:

1. Ease of Use. Most participants agreed that the application was straightforward and easy to learn. Citizens in particular emphasized that the reporting process required minimal effort and was intuitive even for first-time users.
2. System Efficiency. Police officers reported that the dashboard interface allowed them to review and update cases quickly, saving significant time compared to manual reporting workflows.
3. User Confidence. Both groups expressed confidence in using the application without needing frequent assistance. This aligns with the system's design goal of minimizing complexity for diverse user backgrounds.

In addition to quantitative scores, qualitative feedback was collected through observation and open-ended questions. Citizen feedback highlighted the simplicity of the reporting process and the usefulness of real-time tracking. Several participants specifically mentioned appreciating the ability to upload photos and automatically include their location when submitting complaints, as it made reports more precise and credible. However, some participants recommended additional features such as push notifications for status updates and a history log of all previously submitted reports. A few users also suggested clearer visual icons for complaint categories to improve readability and engagement. Police officer feedback emphasized the efficiency of the administrative dashboard but suggested further integration with existing internal police databases to enable cross-referencing of case records. They also noted that automatic synchronization with back-office data systems would streamline report validation and reduce manual data entry.

The results of the SUS evaluation are summarized in Fig. 5, which compares usability scores between the two participant groups. As shown in the figure, citizens achieved an average score of 84.2, while police officers recorded a score of 80.7. Both scores are above the threshold of 80, which is considered to represent an "Excellent" level of usability [3]. The slightly higher score among citizens suggests that the application interface is particularly well-suited to first-time users and individuals without technical backgrounds, reflecting the design objective of simplifying the complaint submission and tracking process. Police officers, while also satisfied, expressed expectations for more advanced functionalities, which explains their slightly lower score.

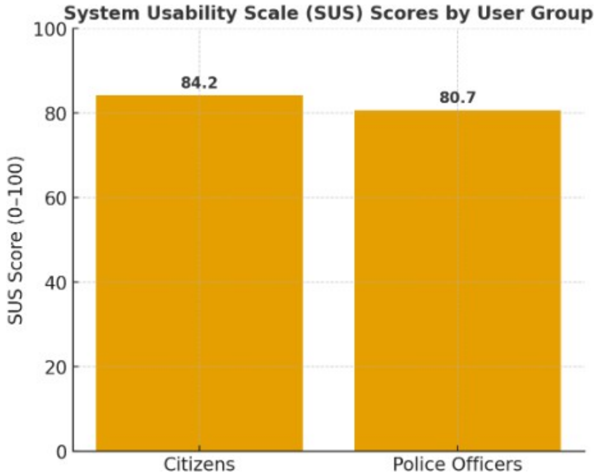


Fig. 5 System Usability Scale (SUS) scores by user group.

Overall, these findings demonstrate that the application is both functional and user-friendly, with strong acceptance among its intended stakeholders. The high SUS scores indicate strong potential for adoption across both citizens and police officers, reinforcing the effectiveness of the system design and implementation.

3.4. Discussion

The results of functional and usability testing demonstrate that the Digital Police Assistance Application successfully fulfills both the technical and user-centered requirements defined during the analysis phase. From a functional perspective, all core features, including complaint submission, real-time tracking, information dissemination, and administrative management, operated as intended (see Table 1). This confirms that the system can support the main objectives of improving communication efficiency and enhancing service transparency between the police and the community.

From a usability perspective, the application achieved an average SUS score of 82.5, placing it in the "Excellent" category. This finding is consistent with prior studies which emphasize that mobile applications with scores above 80 are generally well-accepted by users and have a high likelihood of adoption [4]. The results further reveal that citizens scored slightly higher (84.2) compared to police officers (80.7). This indicates that while the application is easy to use and intuitive for community members, police officers expect additional functionalities such as integration with existing internal databases. This expectation aligns with research on e-policing systems, which suggests that administrative users often demand higher levels of system interoperability for operational efficiency [5].

The discussion of citizen feedback highlights the importance of simplicity and transparency. Participants noted that the ability to track complaints in real time fostered greater trust in police responsiveness. This resonates with findings from [6], who argue that transparency is a significant determinant of public trust in e-government services. Similarly, the demand for push notifications suggests that real-time communication plays a vital role in strengthening user engagement and satisfaction.

Meanwhile, police officers emphasized the efficiency gained from the administrative dashboard, especially in handling multiple reports simultaneously. This observation aligns with prior research demonstrating that digital case management tools reduce response time and improve accountability within law enforcement organizations [7]. However, integrating the proposed system with existing law enforcement databases presents both technical and organizational challenges. These include differences in data standards, access permissions, and network security policies. Future integration should adopt standardized APIs and data exchange formats, as recommended by Xu and Chan [8], to ensure interoperability and secure communication across systems.

Compared with other digital policing systems such as *PeduliLindungi* [3] and *Disdukcapil* public service applications [2], the proposed system achieved comparable or higher SUS scores, demonstrating that integrating complaint tracking and real-time updates significantly improves user satisfaction. This result suggests that context-specific customization for local law enforcement enhances usability in public service applications.

Overall, the findings confirm that the developed system addresses the limitations of conventional reporting mechanisms by providing faster response times, enhanced transparency, and improved accountability. At the same time, the study highlights areas for further improvement, particularly in the domains of system integration, data security, and scalability. These insights contribute not only to the development of the application itself but also to the broader body of knowledge on digital public service innovation in law enforcement.

4. Conclusion

This study presented the design and implementation of the Digital Police Assistance Application, a mobile-based system aimed at enhancing public service delivery in law enforcement. The application was developed using a hybrid technology stack with Flutter for the mobile client, Node.js with Express for the backend, and MySQL for structured data management. Core functionalities included complaint submission with multimedia support, real-time tracking of case progress, dissemination of public announcements, and an administrative dashboard for police officers.

The evaluation confirmed that the system successfully met its functional requirements, as validated through Black Box testing, with all major modules operating as intended. Usability testing with 30 participants yielded an average SUS score of 82.5, placing the application in the “Excellent” category. Citizens particularly appreciated the simplicity of the reporting process and transparency of case tracking, while police officers emphasized the efficiency of the dashboard. These findings highlight the system’s effectiveness in addressing challenges of conventional reporting mechanisms, including delays, limited accessibility, and lack of transparency.

The main contributions of this study can be summarized as follows. First, it introduces an integrated platform that unifies complaint reporting, case tracking, and information dissemination into a single mobile application. Second, it provides empirical validation of system usability through standardized testing, demonstrating strong potential for adoption by both citizens and law enforcement officers. Finally, the study offers valuable insights from user feedback, which can serve as a basis for refining future digital public service applications in the policing domain.

Future work will focus on enhancing the application in several key areas. Integration with internal police databases and national reporting platforms will improve interoperability and provide more comprehensive case management. Strengthening security measures, such as implementing multi-factor authentication and encrypted data storage, will further protect sensitive user information. Additionally, expanding the system with predictive analytics and machine learning can support incident classification and priority-based resource allocation. Finally, larger-scale pilot testing across multiple jurisdictions will be essential to validate scalability and assess the broader impact of the system in real-world settings.

In conclusion, the Digital Police Assistance Application demonstrates that mobile-based solutions can effectively improve community–police interactions by providing transparent, efficient, and user-friendly mechanisms for reporting and managing incidents. With continued development and integration, such systems hold significant potential to advance digital transformation in law enforcement and strengthen public trust in policing institutions.

Reference

[1] F. Munandar and H. B. Santoso, “User interface improvement by evaluating usability and user experience: Case study of Indonesia’s government financial management information system,” Indonesian Journal of Computer Science, vol. 14, no. 1, pp. 1–18, Feb. 2025. [Online]. Available: https://ijcs.net/ijcs/index.php/ijcs/article/view/4630

[2] A. Martalisa, S. W. Saputro, D. T. Nugrahadi, F. Abadi, and I. Budiman, “Evaluation of user experience in the Banjarbaru Disdukcapil public service application using UEQ and SUS,” Scientific Journal of Informatics, vol. 11, no. 4, pp. 925–936, Dec. 2024. doi: 10.15294/sji.v11i4.13780

[3] A. L. Dyayu, B. Beny, and H. Yani, “Evaluasi usability aplikasi PeduliLindungi menggunakan metode usability testing dan System Usability Scale (SUS),” Jurnal Manajemen Teknologi dan Sistem Informasi (JMS), vol. 3, no. 1, pp. 395–404, Mar. 2023.

[4] F. Nopriani and M. A. Muhammad, “Pengujian usability website dokumentasi menggunakan System Usability Scale (SUS),” Methodika: Jurnal Teknik Informatika dan Sistem Informasi, vol. 10, no. 2, pp.

1–6, Sep. 2024.
[5] techUK, "Demystifying digital interoperability in policing," TechUK Reports, 2024. [Online]. Available: https://www.techuk.org/resource/demystifying-digital-interoperability-in-policing.html
[6] J. Brooke, "SUS: A quick and dirty usability scale," in Usability Evaluation in Industry, P. W. Jordan, B. Thomas, B. A. Weerdmeester, and I. L. McClelland, Eds. London, U.K.: Taylor & Francis, 1996, pp. 189–194
[7] X. Xu and T. Chan, "Interoperability in law enforcement information systems: Challenges and opportunities," Government Information Quarterly, vol. 41, no. 2, pp. 101–112, Apr. 2024. doi: 10.1016/j.giq.2024.101741
[8] The Police Foundation, "The power of information: How to unlock the potential of digital data and technology in policing," Research Report, London, U.K., 2024.